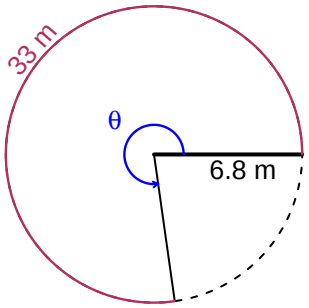
Name: Date:

Trig Final (SLTN v633)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The arc length is 33 meters. The radius is 6.8 meters. What is the angle measure in radians?

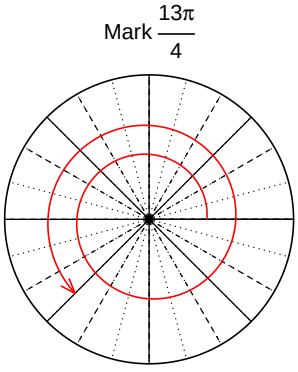


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

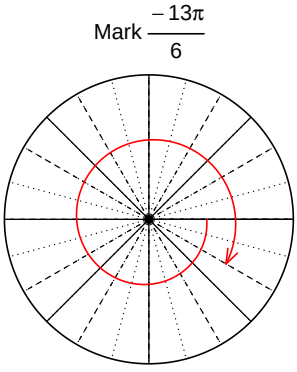
$\theta = 4.853$ radians.

Question 2

Consider angles $\frac{13\pi}{4}$ and $\frac{-13\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{13\pi}{4}\right)$ and $\sin\left(\frac{-13\pi}{6}\right)$ by using a unit circle (provided separately).



Find cos(13π/4)



Find sin(−13π/6)

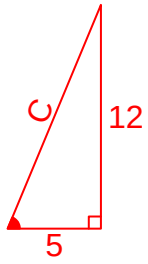
$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$

$\sin(-13\pi/6) = \frac{-1}{2}$

Question 3

If $\tan(\theta) = \frac{-12}{5}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

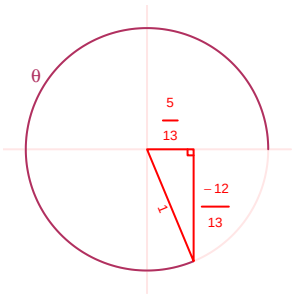
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$5^2 + 12^2 = C^2$$
$$C = \sqrt{5^2 + 12^2}$$
$$C = 13$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-12}{13}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 3.76 Hz, an amplitude of 4.94 meters, and a midline at $y = -6.83$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 4.94\sin(2\pi 3.76t) - 6.83$$

or

$$y = 4.94\sin(7.52\pi t) - 6.83$$

or

$$y = 4.94\sin(23.62t) - 6.83$$